

ETHYLIDENE DICHLORIDE

Ethylidene dichloride is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 75-34-3

CH_3CHCl_2

Molecular Formula: $\text{C}_2\text{H}_4\text{Cl}_2$

Ethylidene dichloride is a colorless, mobile oily liquid with an aromatic, ethereal odor and taste. It is soluble in alcohol, ether, fixed and volatile oils, and is slightly soluble in water (Merck 1983). Ethylidene dichloride is also combustible (Sax, 1987).

Physical Properties of Ethylidene Dichloride

Synonyms: 1,1-dichloroethane; ethylidene chloride; chlorinated hydrochloric ether

Molecular Weight:	98.96
Boiling Point:	57.3 °C
Melting Point:	-97.7 °C
Vapor Density:	3.44 (air = 1)
Density/Specific Gravity:	1.1757 at 20/4 °C (water = 1)
Vapor Pressure:	227 mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	1.79
Water Solubility:	5060 mg/l at 25 °C
Henry's Law Constant:	5.87×10^{-3} atm-m ³ /mole
Conversion Factor:	1 ppm = 4.05 mg/m ³

(Howard, 1990; HSDB, 1991; Merck, 1983; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Sources of ethylidene dichloride include production of 1,1-trichloroethane, antiknock gasoline where it is used as a coupling agent, paint and varnish removers, metal degreasers, and ore flotations. The primary stationary sources of ethylidene dichloride in California are sanitary services, combination utility services, and national security (ARB, 1997b).

B. Emissions

The total emissions of ethylidene dichloride from stationary sources in California are estimated to be less than 30 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Ethylidene dichloride does not occur as a natural product (Howard, 1990).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of ethylidene dichloride. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from several urban and suburban locations in the United States. From these data, the U.S. EPA calculated an overall mean ambient concentration from 1976-87 of 0.17 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or 0.04 parts per billion (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of ethylidene dichloride was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

The only important chemical loss process for ethylidene dichloride in the atmosphere is reaction with the hydroxyl (OH) radical. Based on this reaction, the atmospheric half-life and lifetime of ethylidene dichloride is estimated to be 35 days and 50 days, respectively. The reaction product for this reaction includes $\text{CH}_3\text{C}(\text{O})\text{Cl}$ (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics “Hot Spots” Program (AB 2588). Of the risk assessments reviewed as of April 1996, ethylidene dichloride (1,1-dichloroethane) contributed to the total cancer risk in 1 of the approximately 550 risk assessments reporting a total cancer risk equal to or greater than 1 in 1 million (OEHHA, 1996a).

HEALTH EFFECTS

Probable routes of human exposure to ethylidene dichloride (1,1-dichloroethane) are inhalation or dermal contact (Sittig, 1991).

Non-Cancer: Inhalation exposure to ethylidene dichloride may cause mild eye and respiratory tract irritation. At high levels ethylidene dichloride is a central nervous system depressant. By analogy to other chlorinated hydrocarbons, overexposure may sensitize the heart to the arrhythmogenic effects of epinephrin causing cardiac arrest. Ethylidene dichloride may cause kidney and liver injury in test animals (Sittig, 1991; U.S. EPA, 1994a).

The U.S. EPA is currently reviewing the oral Reference Dose (RfD) for ethylidene dichloride and has calculated a provisional RfD of 0.1 milligrams per kilogram per day. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has the Reference Concentration (RfC) under review (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of ethylidene dichloride in humans. Retarded fetal development, but no malformation was reported in one animal reproductive study from inhalation exposure to ethylidene dichloride (U.S. EPA, 1994a).

Cancer: A significantly positive dose-related trend in hemangiosarcomas, mammary tumors, liver tumors, and endometrial stromal polyps by oral exposure was found in an animal study. The U.S. EPA has placed ethylidene dichloride in Group C: Possible human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified ethylidene dichloride for its carcinogenicity (IARC, 1987a).

The State of California has determined under Proposition 65 that ethylidene dichloride (1,1-dichloromethane) is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 1.6×10^{-6} (microgram per cubic meter)⁻¹ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to $1 \mu\text{g}/\text{m}^3$ of ethylidene dichloride is estimated to be no greater than 1.6 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 5.7×10^{-3} (milligram per kilogram per day)⁻¹ (OEHHA, 1994).

